

# Ferns of the Dells

of the Wisconsin River



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# FERNS OF THE DELLS

## OF THE WISCONSIN RIVER

By RUTH MARSHALL

Illustrated with photographs by

EVALINE M. BENNETT and BLANCHARD HARPER



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MOST of the cuts for this booklet are from photographs of ferns made by Mrs. Bennett, and used here for the first time. The illustrations for the long beech purple, cliff brake, maidenhair, oak, marginal shield, crested shield, spinulose wood, silvery spleenwort and sensitive ferns are from Miss Harper's negatives, and are part of a collection made by her to illustrate a booklet issued by the Chicago, Milwaukee and St. Paul railroad.



HERE is, perhaps, no group of plants which can give such large returns in pleasure and profit to the amateur naturalist as do the ferns. Their grace and delicacy, the attractiveness of their haunts, the satisfactory way in which they can be preserved, their willingness to be domesticated,—all these characters make them favorites with nature lovers.

The Dells of the Wisconsin River are favored haunts of the ferns. In all, twenty-seven species are known, a large majority of all of the ferns native to the state, and a good representation of the ferns of the northern and eastern states. In the nine miles of its wanderings between sandstone cliffs, the banks of the Old Wisconsin show great diversity of conditions, from the standpoint of a fern: deep shady ravines with dripping rocks for the bladder ferns; rich moist woods running up from the dells for the shield ferns; dry sunny uplands to cultivated fields and woods where the bracken grows; exposed ravines with dry shelving rocks where the purple cliff brake gets a foothold; and wet sunny spots where the marsh fern thrives. Delicate ferns and hardy, ferns like the slender cliff brake so small that they escape attention unless you are ready to see them; big sturdy ferns reaching almost to your shoulder, like a jungle of the interrupted fern; rare ferns whose haunts are known and jealously guarded by the few who care for them; and even a few stragglers, like the walking leaf, more at home on limestone formations. A paradise of ferns!

Much of the beauty of the small ravines is due to the ferns. But

they have suffered in the last years from the crowds of excursionists who have tramped them down, or pulled them up only to throw them away on the home trip. Twenty-five years ago the fragrant fern was so common that it was dug up and sent away by the basketsful. Specimens in old herbariums, like that of I. A. Lapham, Wisconsin's early naturalist, who, back in the '50's made a collection of the ferns of the Dells, show leaves six or eight inches long. Now one may search all day and consider himself in luck if he finds a single tiny plant. The raising of the water by the dam shortens up the ravines and restricts their haunts. It is hoped that the thoughtfulness and moderation of coming generations of visitors will save them from further destruction. This short account is intended to help the beginner to a further enjoyment and appreciation of the ferns, not the least of the attractions of the Dells of the Wisconsin.

Enough of structure and terminology should be mastered to get at least a speaking acquaintance with the ferns, and that is all that is attempted here. The more complex study of development and reproduction is omitted.

The leaf, or *frond*, is the distinctive part of the fern. It is not essentially different from the leaf of a flowering plant. Very often it is much divided or cut (compound), and to this character it owes much of its grace and delicacy. There is usually a large scaly underground stem, or *rootstock*, from which the leaves and roots grow. The primary divisions of the blade are called *pinnae*, and subdivisions of the pinnae are called *pinnules*. Fern leaves are characterized by the presence here of the plant's *spores*, or repro-



ductive cells. These spores, too tiny to be readily seen with the naked eye, are enclosed in little spore-cases, or *sporangia*, which grow in clusters or lines called fruit dots, or *sori*, on the backs of the leaves. The sori turn brown when ripe, and then they become a conspicuous character. They may be naked, as in the common polypody, or covered by the reflexed edge of the leaf, as in the maidenhair, or they may have a special covering, the *indusium*, as in the shield ferns. The position and character of the sori determine largely the relationships of the ferns, and hence their classification.

In the simpler ferns, all of the leaves bear spores; but in many species there is a division of labor, only a part of the fronds producing them. The latter are then distinguished as the *fertile*, the other as the *sterile* leaves. Fertile leaves may differ only slightly from the sterile, or they may become so modified and specialized, as in the sensitive fern, that they have a very different appearance from the sterile. In some cases a few pinnae only are thus modified, as in the flowering fern.

In the nomenclature and the sequence of the species Gray's Manual (revised, 1908), has been used throughout.



## COMMON POLYPODY

*Polypodium vulgare* L.

**L**EAVES oblong, deeply cut into oblong blunt segments, the blade and its divisions of nearly the same width throughout. Pinnae alternate, the sinuses between them broad, reaching nearly or quite to the midrib. Sori without indusia, a row on each side of the midvein of the upper pinnae, very large and conspicuous, appearing in early summer, finally turning dark brown. Blade tough, smooth and evergreen, from a few inches to a foot in length; stems light brown, long, several arising close together from a long, slender creeping rootstock near the surface.

This sturdy fern is very common, growing everywhere on the more exposed ledges, often high up, and in large masses.



## LONG BEECH FERN

*Phegopteris polypodioides* Fee

**L**EAF blade triangular, somewhat longer than broad, compound, the segments deeply divided. Pinnae oblong, pointed, cut almost to the midrib, the two lower narrowed at the base, and turned forward and down in a very characteristic manner; upper pinnae becoming smaller and less divided, forming a long slim lobe at the top. Divisions of the pinnae oblong, blunt, the lower ones joining the midrib of the blade. Sori small, round, without indusia, close to the lower edge of the divisions of the pinnae, maturing in late summer. Blade sometimes eight inches long, thin, soft, downy, especially underneath, yellowish, withering in early autumn, usually bent at an angle with the stem. Stems variable in length, often reaching several inches, scaly at the base, arising from long slender branched rootstocks.

This fern and its near relative, the oak fern, are very characteristic of the ledges of many of the ravines, their rootstocks intertwining and filling the crevices, while the blades in crowded clusters form a border over the overhanging rocks.



## OAK FERN

*Phegopteris dryopteris* (L.) Fee

**L**EAF ternate, of three triangular divisions, the central largest, each pinna again divided. Pinnules oblong, rather blunt, diminishing in size toward the top, the lower separate, cut nearly or quite to the midrib into oblong blunt divisions, the upper merely scalloped and united; pinnules of the lateral pinnae longest on the lower side. Sori small, round, without indusia, close to the edges of the ultimate divisions. Blade thin, smooth, light green, sometimes six inches long, its divisions spreading more or less at right angles to the stem, which is very long, slender and scaly at the base, and arises from a creeping rootstock.

This is one of the most delicate and beautiful of the ferns, and a very common one. It grows thickly in the crevices of moist ledges, associated with the long beech fern.





## MAIDENHAIR

*Adiantum pedatum* L.

**S**TEM dark chestnut, polished, often a foot or more in length, forking at the summit, the branches curving around almost at right angles to the direction of the stem, bearing on one side oblong compound pinnae which decreases in length from the center, the entire leaf being thus somewhat orbicular, a foot or more across. Largest pinnae six to ten inches long, of nearly uniform width, bearing from forty to fifty pinnules alternately on slender stems. Pinnules triangular-oblong, the upper margin cut and scalloped, the edges reflexed to form the indusia of the oblong or crescent-shaped sori. Blades smooth, deep green. Rootstock large, dark chaffy, much branched.

This is, perhaps, our most beautiful fern, and the fern best known. Its haunts are the deep rich woods which slope up from the moist ravines; here it is very common, growing in graceful open clusters.



## COMMON BRAKE, BRACKEN

*Pteris aquilina* L.

**L**EAF ternate, each pinna doubly compound and bent away from the main stem; the central largest, triangular, stalked, the lateral ones narrower. Pinnules oblong-lanceolate, divided into oblong blunt segments which are again divided in the lower pinnules of the middle pinna, all divisions becoming less toward the apex. Sori forming a continuous line along the edges, covered by the reflexed margins. Stems straw-colored from a deep, stout rootstock. Leaves solitary, from one to two feet across, dull green, thick.

A large and rather coarse fern, the brake grows abundantly on the exposed uplands away from the ravines.



## PURPLE CLIFF BRAKE

*Pellaea atropurpurea* (L.) Link

**L**EAVES narrow, nearly twice compound; pinnae widely separated, variable in number, oval or elliptical, one or more of the lower pairs short-stalked and usually divided into from two to five pinnae. Sori bright brown, marginal, covered by the entire reflexed edge of the blades. Sterile fronds rare, small, with broader pinnae. Stems wiry, smooth, purplish, from a short rootstock covered with bright hair-like scales. Blades bluish, leathery, evergreen, finally dropping away to leave the bare stems among the clumps of young leaves. Entire length not often exceeds eight inches.

One occasionally finds clumps of the purple cliff brake in the Lower Dells, high up in the crevices of the dry exposed rocks. It is a fern more at home on limestone cliffs.



## SLENDER CLIFF BRAKE

*Cryptogramma stelleri* (Gmel.) Prantl.

**L**EAVES both fertile and sterile, the two kinds unlike, but with transitional forms, variable. Blades yellowish, small and delicate, thin, veiny, compound, from long, slender straw-colored or brown stalks which grow in clusters from a thin rootstock. Blades of sterile fronds about two inches long, broadly ovate; pinnae about seven, oblong to triangular, broad, the upper confluent with the stem, the lower more or less completely divided. Pinnules three to five, with triangular bases and variously cut and scalloped tops. Fertile fronds larger, the pinnae more numerous, all but the uppermost more or less completely divided into oblong pinnae. Sori marginal, nearly the entire edge of the blades reflexed to form the conspicuous indusia.

Like its relative, the purple cliff brake, this fern is more often found in limestone regions, but its habits are entirely different. It is rare in the Wisconsin Dells, and one of the most delicate, as it is one of the smallest species. It grows in the crevices of wet rocks which are well shaded by overhanging ledges.





## MAIDENHAIR SPLEENWORT

*Asplenium trichomanes* (L.)

**L**EAVES linear, very slender, once divided. Pinnae fifteen to twenty pairs, widely separated, one-half an inch or less in length, the sides unequal, round or oblong with scalloped edges. Sori very conspicuous, oblong, three to six arranged obliquely along the sides of the midrib, covered with delicate indusia. Blades dark, evergreen, on dark purplish wiry polished stems, which arise in clusters from a short scaly rootstock, and persisting after the blades fall away. Largest leaves about seven inches in length.

The spleenworts are represented in the Dells by three species, of which this is the smallest. The maidenhair spleenwort is rather common but easily escapes notice. It finds a foothold in small crevices of rather dry shaded rocks, where it spreads out its clusters of dainty slender leaves intermingled with the dead stems of previous years.



## SILVERY SPLEENWORT

*Asplenium acrostichoides* Sw.

**L**ARGE oblong leaves, tapering at both ends, compound. Pinnae numerous, widely separated, linear, tapering to a slender apex, cut almost to the midrib into many oblong blunt segments, slightly toothed. Sori oblong, large, three to six pairs closely and regularly packed on either side of the midrib, occupying most of the under side of the blades, covered when young with silvery indusia. Many leaves sterile. Blades dark, rather delicate, slightly hairy, becoming coarser, erect and more heavily fruited in sunny places. Stems slightly chaffy, straw-colored, from thick, creeping rootstocks, the entire fronds one to two feet long, forming nearly circular clumps.

Groups of this fern are rather common in the rich, moist woods forming the slopes of the large ravines; it is often associated with the lady fern and the wood ferns, which it somewhat resembles. The indusia remaining silvery-white till mid-summer give the characteristic appearance to the back of the fern which has suggested the common name; later the leaves become brown and scraggy.



## LADY FERN

*Asplenium filix-femina* (L.) Bernh.

**L**EAVES large, broadly lanceolate, twice pinnate. Pinnæ numerous, oblong, with very tapering points. Pinnules oblong, very numerous, the bases confluent with the stem by very narrow margins, the small upper ones more or less united, the edges variously toothed. Sori short with straight or curved indusia, in two rows on each pinnule, becoming very conspicuous in late summer. Fertile and sterile, leaves alike. Stems usually straw-colored, growing in tufts from a creeping rootstock. Entire frond two or more feet in length.

This is the most delicate of the large ferns; it grows in graceful clumps in shaded moist woods in the ravines or uplands, and is very common. Much of its beauty is lost by midsummer, when the leaves become heavily fruited and torn.



## WALKING LEAF

*Camptosorus rhizophyllus* (L.) Link

**L** EAF entire, wavy edged, with a cordate or sometimes auricled base, tapering to a very long and attenuated apex which often bends over and roots, forming a new plant. Sori elongated, irregularly scattered, confluent, forming very heavy, oblique lines or masses after the withering of the indusia. Stems light-colored, growing in tufts from a short root-stock. Leaves usually not more than six inches long, leathery and evergreen, forming a mat.

A fern so un-fernlike as this might easily escape attention; but it is also the rarest of the Dells ferns. Its haunts are the tops of dry shaded rocks, preferably limestone. It is an odd little plant, and its common name, which refers to its unusual manner of propagation, adds to its interest.





## MARSH FERN

*Aspidium thelypteris* (L.) Sw.

**L**EAVES lanceolate, scarcely narrower at the base than at the middle, pinnate, slightly hairy beneath, the fertile fronds taller and narrower than the sterile. Pinnae numerous, oblong, pointed, set nearly at right angles with the stem, often curled, divided nearly or quite to the midrib into numerous, short oblong segments which appear quite pointed in fertile leaves by the recurving of the edges. Sori numerous, in a double row on each segment, small, with minute kidney-shaped indusia, which soon wither, the sporangia then becoming confluent and nearly covering the under side of the pinnae. Stems straw-colored, very long, especially in the fertile leaves, growing from a slender creeping rootstock. Leaves sometimes two feet long, produced all summer, the fertile ones not appearing until mid-summer.

The *Aspidiums*, or shield ferns, the latter name an allusion to the shape of the indusium, constitute a large genus, which is represented by five species in the Dells. The marsh fern, unlike the others, is found in wet ground, growing and fruiting most abundantly in the sun. In the shade the leaves are larger and of a finer texture. It may be found in the marshes along the streams running out of some of the ravines.



## FRAGRANT SHIELD FERN

*Aspidium fragrans* (L.) Sw.

A SMALL plant with narrow lanceolate compound leaves, glandular and aromatic, most of them fertile. Pinnae numerous, oblong, divided almost to the midrib into several broad obtuse divisions which are usually toothed. Sori few but large, the conspicuous indusia orbicular and persistent, sometimes covering most of the under side of the pinnae. Stems covered more or less thickly with brown scales, from a stout, scaly, rootstock. Leaves a few inches long, arising in a crown, evergreen, firm of texture, the old leaves brown and persistent.

This much sought-after fern, once famous in the Dells, has been almost exterminated, in spite of its love for almost inaccessible places. It grows in crevices of rather dry shaded perpendicular cliffs.



## MARGINAL SHIELD FERN. EVERGREEN WOOD FERN.

*Aspidium marginale* (L.) Sw.

**L**ARGE oblong or broadly lanceolate compound leaves. Pinnae short-stalked, numerous, lanceolate, somewhat scythe-shaped, with tapering points, the lower ones cut almost to the midrib into oblong blunt divisions, those on the lower pinnae somewhat scalloped; upper pinnae smaller and less divided. Sori large, round, separated, with persistent convex indusia, placed near the margins of the divisions, often produced on the upper and middle pinnae only, or sometimes entirely lacking. Stems rather short, covered with scales, especially at the base where they arise from a stout, scaly rootstock. Leaves, dark blue-green, rather leathery, evergreen, arising in clumps, several inches to two feet or more in length.

This hardy and beautiful species is very common in the rocky, wooded sides of moist ravines, where its graceful crown of leaves may be sheltered by the base of a tree. Its common name (marginal) refers to the position of the sori.



## CRESTED SHIELD FERN.

*Aspidium cristatum* (L.) Sw.

**L**EAVES linear-oblong or lanceolate, compound, with conspicuous veining. Pinnae numerous, separated, triangular-oblong, the lower ones broadest, and short-stalked, deeply cut into several broad blunt segments which are finely toothed, the upper pinnae confluent and less divided, all of the pinnae showing a tendency to turn their faces toward the apex of the leaf. Sori in two rows on the divisions of the pinnae, separated, with rounded or kidney-shaped thin indusia. Stems more or less covered with light brown scales, from a stout densely chaffy rootstock. Leaves dark green, the sterile ones shorter and evergreen, the fertile sometimes two feet long.

One seldom sees this *Aspidium* in the Dells. It grows in damp places, preferably in shaded bogs.





## SPINULOSE WOOD (SHIELD) FERN.

*Aspidium spinulosum* var. *intermedium* (Muhl.) D. C. Eaton

**L**ARGE twice-compound leaves, broadly oblong-ovate, variable. Pinnae numerous, separated, spreading, oblong-lanceolate, the pinnae of one or two of the lowest pairs longest on the lower side. Pinnules crowded, ovate to oblong, connected by a narrow wing in the lower pinnae, confluent in the upper, all of them again cut into oblong lobes which are toothed at the apex. Sori small, rather irregularly placed on or at the base of the ultimate divisions, covered with delicate kidney-shaped indusia which are glandular. Stems with a few dark centered scales, arising in early spring in a cluster from a stout scaly rootstock. Leaves from several inches to two feet or more in length.

This is the most beautiful of the woods ferns. The deeply cut spreading leaves have the appearance of plumes. Their graceful clumps are found abundantly in the rich woods on the sides of the ravines, with the evergreen wood fern. The common name, spinulose, refers to the little teeth on the smallest divisions of the leaf.



## BULBLET BLADDER FERN

*Cystopteris bulbifera* (L.) Bernh.

VERY long, slender, twice-compound vine-like leaves, frequently bearing one or more fleshy bulblets on the under side at the bases of the upper leaflets. Pinnae numerous, oblong-lanceolate, the basal ones longest; pinnules crowded, distinct only in the lowest pinnae, oblong and blunt, variously divided and toothed. Sori few, inconspicuous, rounded, placed near the base of some of the ultimate divisions. Indusium short, hood-like, early withering. Sterile fronds shorter and broader, not common. Stems short, slender, light-colored, rather brittle, arising from a short rootstock. Leaves drooping, sometimes two feet long.

There are two bladder ferns in the Dells. The name bladder has reference to the delicate hood-shaped indusium. The bulblets of this fern, which are really buds, afford a quicker means of propagation. It is typically a plant of limestone regions, found only in a few of the ravines, where it trails its delicate foliage over the dripping rocks.



## FRAGILE BLADDER FERN

*Cystopteris fragilis* (L.) Bernh.

**T**WICE compound, oblong-lanceolate leaves with tapering apex, variable. Pinnae numerous, the lower ones distant and broad with short stalks, the upper ovate to oblong. Pinnae distinct only in the lower pinnae, joined by a narrow wing along the stem, broad and blunt, variously toothed. Sori small, abundant, the very thin indusium soon withering. Stems slender and brittle, long, arising from a slender creeping rootstock. Leaves thin, drooping, from a few inches to more than a foot in length, nearly all fertile, the first produced very early in spring, continuing to appear and fruit all summer if there is abundant moisture.

This is a common fern and one of the most delicate. It grows where there is shade and moisture, preferably clinging to the rocks. In general form the leaf resembles that of the blunt-lobed woodsia which sometimes grows with it.



## RUSTY WOODSIA

*Woodsia ilvensis* (L.) R. Br.

**S**MALL, hairy, linear-lanceolate compound leaves. Pinnae very numerous, crowded toward the top, ovate to oblong, blunt, deeply cut into several oblong, obtuse segments which are slightly scalloped. Sori small and numerous, near the margins of the divisions, somewhat confluent; the very thin indusium attached by its base under the sorus, dividing into slender hairs which curl over the sporangia. Stems short, hairy, stout, reddish, with an obscure joint about an inch from the base, where the leaves break off. Rootstock stout. Leaves in tufts, a few inches long, thick, dark green, leathery; the upper side generally smooth, the lower thickly clothed with coarse shining hairs which turn rusty red at maturity.

There are two woodsias in the Dells. This species is very common, growing on dry rocks, often very much exposed. The common name very appropriately describes the mature leaves.





## BLUNT-LOBED WOODSIA.

*Woodsia obtusa* (Spreng.) Torr.

**L**EAVES broad lanceolate, almost twice pinnate. Pinnae about twenty pairs, obtuse, the lower one separated, the bases nearly divided into oblong pinnules, the upper parts more or less cut into segments, all divisions obtuse and minutely scalloped. Sori small, round, near the margins of the segments; the indusium distinct, fastened under the sorus, splitting at length into broad pieces which spread out, star-like. Stems light green, with a few brownish scales, not jointed, arising from a short rootstock. Leaves several inches long, minutely hairy underneath.

This woodsia is not common; it is sometimes confused with the fragile bladder fern which it somewhat resembles in general outline. It is found on shaded ledges, more often in the Lower Dells.



## SENSITIVE FERN

*Onoclea sensibilis* L.

RATHER coarse, large ferns with anastomosing veins, sterile and fertile fronds, very unlike. Sterile leaves, broadly triangular, divided into several long narrow divisions which form distinct pinnae in the last pair, contracted at the base; upper divisions connected by a wing, finally confluent at the apex; margins of the upper divisions entire or wavy, the lower becoming more deeply scalloped. Stems of sterile leaves very long, yellow, arising singly and all summer from a slender shallow creeping rootstock which is much branched; the entire leaf from a few inches to two feet or more in length. Fertile leaves shorter and erect, produced in groups in early summer, persistent through winter; the blades twice compound, the pinnules contracted and rolling up to form dark green berry-like structures which turn dark brown, opening the following spring to discharge the spores. Sori rounded; indusia very delicate, hood-like, early withering. Forms intermediate between fertile and sterile leaves occasionally found.

This common fern, one of the two species of *Onoclea* in the Dells, grows in low, moist open ground, often forming a border or mass along the streams. The common name seems inappropriate; but the sterile leaves wither quickly when picked, and are sensitive to early frosts.



## OSTRICH FERN

*Onoclea struthiopteris* (L.) Hoffm.

VERY large ferns, compound, fertile and sterile fronds very unlike. Sterile leaves two to several feet long, oblanceolate, with rounded top; pinnae very numerous, slender and pointed, several inches long near the center, narrowing to very short ones at the base, with edges very deeply cut into a great number of short, close, somewhat scythe-shaped segments. Stalks very short, arising in a cluster in spring from a very stout short rootstock which produces runners; texture of the blade firm, veins free and simple. Fertile leaves, one to few, shorter, erect and stiff, arising in July from the center of the crown of sterile leaves; stems stout, deeply grooved in front, and blades once divided, the edges of the numerous long pinnae closely rolled together to form pod-like dark green segments, turning brown, enclosing the crowded and confluent sori which open to discharge the spores in the following spring.

The ostrich fern is, probably, the most graceful of the big ferns. The sterile leaves growing in a crown suggest a cluster of ostrich feathers, and the fertile leaves are like stiff plumes. The former may be confused with the sterile fronds of the cinnamon or the interrupted ferns. This fern is found in several places in the Dells, in low rich moist ground.



## FLOWERING FERN. ROYAL FERN.

*Osmunda regalis* L.

TALL ferns with compound leaves, the upper parts of some being fertile. Pinnae in several pairs, opposite and separated, a few inches long. Pinnules numerous, alternate, distinct and separate, often with short stalks, oblong-ovate to lanceolate, finely toothed, especially near the apex; bases oblique, truncated or even cordate or eared, the uppermost often lobed. Spores green, in large naked, globular, short-stalked spore-cases which open by a longitudinal slit. Upper pinnae of fertile fronds very much contracted and destitute of chlorophyll, bearing the spore-cases on the margins of their stem-like divisions in long cylindrical brown clusters. Leaves two or more feet high, their blades smooth, with forked veins, light green, finally turning brown; stems stout, light brown, arising in clumps from a thick rootstock in spring.

There are three *Osmundas* in the Dells. The flowering fern shows its relationship only in the fertile parts; it may easily be mistaken for a seed plant bearing a panicle of small flowers. It grows in large patches in shaded wet ground along the borders of streams.





## INTERRUPTED FERN. CLAYTON'S FERN.

*Osmunda claytoniana* L.

VERY large, coarse ferns, the tallest leaves fertile in the middle. Fronds oblong-lanceolate, the fertile much taller than the sterile. Pinnae oblong-lanceolate, deeply cut into numerous oblong blunt entire segments, without wool at the base. Two to five pairs of the middle pinnae on the fertile fronds spore-bearing, very much contracted, completely divided, densely cylindric, dark green at first, finally brown and withering. Spore-cases large, globular, naked, opening by a longitudinal slit. Fertile leaves sometimes five feet tall, erect, curving at the top, surrounded by the shorter sterile leaves. Blades smooth, with forked veins, turning yellow in fall. Stems yellow, arising in a cluster from a stout root-stock.

This is the largest fern in the Dells and a very common one in the open ravines. The common name, interrupted fern, refers to the position of the fruiting pinnae on the middle of the fertile leaves. This character readily distinguishes it from the other large ferns of the same general form, the cinnamon and the ostrich.



## CINNAMON FERN

*Osmunda cinnamomea* L.

**L**ARGE ferns, fertile and sterile fronds very unlike. Sterile leaves three or more feet high, with long stems, broadly lanceolate; stem and blade nearly smooth when mature, except for a small tuft of wool at the base of each pinna. Pinnae very numerous, a few inches long, separated, nearly opposite, linear-lanceolate, pointed; margins deeply cut into numerous broad blunt segments; veins forked. Fertile fronds fewer, shorter and linear, wooly, appearing in spring, green at first and erect, soon turning cinnamon brown and withering; blades twice divided, the divisions much contracted, bearing the large globular naked sporangia which open by a longitudinal slit. Spores green, shed early. Rootstock very large, shaggy, creeping, producing the leaves in spring, the fertile ones first, which soon become surrounded by the circle of sterile ones.

The cinnamon fern is one of the largest species. It is rather common, growing in wet shaded ground. The sterile leaves grow in graceful clusters, and in general outline resemble those of the interrupted and the ostrich ferns.



## TERNATE GRAPE FERN

*Botrychium ternatum* (Thunb.) Sw.

**F**LESHY plants, fertile and sterile portions distinct and unlike, the bud of the next year imbedded in the base of the stem which arises from a short erect deep rootstock with fleshy roots. Leaves usually single, from a few inches to a foot or more in height, in two segments, sterile and fertile, slightly hairy, arising from near the base of the stem. The sterile portion dark green, broadly triangular, ternate, the divisions stalked and much divided, the final divisions round to oblong, variable in outlines and margins. Fertile segment long-stalked, inclined, twice pinnate, the contracted divisions bearing each a double row of unstalked naked globular spore-cases, opening by a transverse slit, the whole segment forming a large heavy close cluster.

The genus *Botrychium* is here represented by two species. This one, which is quite unlike most ferns in appearance, is found occasionally on low wet ground. The spore-bearing part, which is not produced till late in the season, bears some resemblance to a miniature cluster of grapes.



## RATTLESNAKE FERN. VIRGINIA GRAPE FERN

*Botrychium virginianum* (L.) Sw.

A SINGLE broadly triangular, much divided leaf, with the fertile portion rising from the center, the entire plant a foot or more high. Sterile portion sessile above the middle of the plant, of three broad pinnae, the middle largest; pinnae short-stalked divided into triangular-oblong divisions which are again deeply cut into lobes, toothed toward the apex. Fertile stalk rising some inches above the sterile, once or twice divided, each division bearing a double row of large spherical naked sporangia, opening by a transverse slit. Sterile portion thin, light green, spreading, appearing in late spring; fertile part later, soon withering. Rootstock very small, with fleshy roots; the stem and its divisions fleshy, bearing the bud of next year in a hollow at the base.

This fern, like its relative the ternate grape, may easily be overlooked as a fern. It is rather common in moist woods. The common name, rattlesnake fern, probably originated in in the fancied resemblance of its stems of sporangia to the rattles of the snake.





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10.	<i>Phegopteris polypodioides</i> Fee,	-	-	-	Long beech fern
12.	<i>Phegopteris dyopteris</i> (L.) Fee,	-	-	-	Oak fern
14.	<i>Adiantum pedatum</i> L.,	-	-	-	Maidenhair
16.	<i>Pteris aquilina</i> L.,	-	-	-	Common brake
18.	<i>Pellaea atropurpurea</i> (L.) Link,	-	-	-	Purple cliff brake
20.	<i>Cryptogramma stelleri</i> (Gmel.) Prantl.,	-	-	-	Slender cliff brake
22.	<i>Asplenium trichomanes</i> L.,	-	-	-	Maidenhair spleenwort
24.	<i>Asplenium acrostichoides</i> Sw.,	-	-	-	Silvery spleenwort
26.	<i>Asplenium filix-femina</i> (L.) Bernh.,	-	-	-	Lady fern
28.	<i>Camptosorus rhizophyllus</i> (L.) Link.,	-	-	-	Walking leaf
30.	<i>Aspidium thelypteris</i> (L.) Sw.,	-	-	-	Marsh fern
32.	<i>Aspidium fragrans</i> (L.) Sw.,	-	-	-	Fragrant fern
34.	<i>Aspidium marginale</i> (L.) Sw.,	-	-	-	Marginal shield or Evergreen wood fern
36.	<i>Aspidium cristatum</i> (L.) Sw.,	-	-	-	Crested shield fern
38.	<i>Aspidium spinulosum</i> var. <i>intermedium</i> (Muhl.) D. C. Eaton,	-	-	-	Spinulose wood (or shield) fern
40.	<i>Cystopteris bulbifera</i> (L.) Bernh.,	-	-	-	Bulblet bladder fern
42.	<i>Cystopteris fragilis</i> (L.) Bernh.,	-	-	-	Fragile bladder fern
44.	<i>Woodsia ilvensis</i> (L.) R. Br.,	-	-	-	Rusty woodsia
46.	<i>Woodsia obtusa</i> (Spreng.) Torr.,	-	-	-	Blunt-lobed woodia
48.	<i>Onoclea sensibilis</i> L.,	-	-	-	Sensitive fern
50.	<i>Onoclea struthiopteris</i> (L.) Hoffm.,	-	-	-	Ostrich fern
52.	<i>Osmunda regalis</i> L.,	-	-	-	Flowering fern. Royal fern
54.	<i>Osmunda claytoniana</i> L.,	-	-	-	Interrupted fern. Clayton's fern
56.	<i>Osmunda cinnamomea</i> L.,	-	-	-	Cinnamon fern
58.	<i>Botrychium ternatum</i> (Thunb.) Sw.,	-	-	-	Ternate grape fern
60.	<i>Botrychium virginianum</i> (L.) Sw.,	-	-	-	Rattlesnake fern. Virginia grape fern





